



Climate change and its effect on agriculture, water resources and human health sectors in Poland

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Year: 2010
Journal: Natural Hazards and Earth System Sciences. 10 (8): 1725-1737

Abstract:

Multi-model ensemble climate projections in the ENSEMBLES Project of the EU allowed the authors to quantify selected extreme-weather indices for Poland, of importance to climate impacts on systems and sectors. Among indices were: number of days in a year with high value of the heat index; with high maximum and minimum temperatures; length of vegetation period; and number of consecutive dry days. Agricultural, hydrological, and human health indices were applied to evaluate the changing risk of weather extremes in Poland in three sectors. To achieve this, model-based simulations were compared for two time horizons, a century apart, i.e., 1961-1990 and 2061-2090. Climate changes, and in particular increases in temperature and changes in rainfall, have strong impacts on agriculture via weather extremes - droughts and heat waves. The crop yield depends particularly on water availability in the plant development phase. To estimate the changes in present and future yield of two crops important for Polish agriculture i.e., potatoes and wheat, some simple empirical models were used. For these crops, decrease of yield is projected for most of the country, with national means of yield change being: -2.175 t/ha for potatoes and -0.539 t/ha for wheat. Already now, in most of Poland, evapotranspiration exceeds precipitation during summer, hence the water storage (in surface water bodies, soil and ground) decreases. Summer precipitation deficit is projected to increase considerably in the future. The additional water supplies (above precipitation) needed to use the agro-potential of the environment would increase by half. Analysis of water balance components (now and in the projected future) can corroborate such conclusions. As regards climate and health, a composite index, proposed in this paper, is a product of the number of senior discomfort days and the number of seniors (aged 65+). The value of this index is projected to increase over 8-fold during 100 years. This is an effect of both increase in the number of seniors (over twofold) and the number of senior-discomfort days (nearly fourfold).

Source: <http://dx.doi.org/10.5194/nhess-10-1725-2010>

Resource Description

Climate Scenario :

specification of climate scenario (set of assumptions about future states related to climate)

Special Report on Emissions Scenarios (SRES)

Special Report on Emissions Scenarios (SRES) Scenario: SRES A2

Communication:

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resource focus on research or methods on how to communicate or frame issues on climate change;
surveys of attitudes, knowledge, beliefs about climate change

A focus of content

Communication Audience:

audience to whom the resource is directed

Public

Exposure :

weather or climate related pathway by which climate change affects health

Extreme Weather Event, Food/Water Security, Food/Water Security, Precipitation, Temperature

Extreme Weather Event: Drought

Food/Water Security: Agricultural Productivity

Temperature: Extreme Heat

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : Poland

Health Impact:

specification of health effect or disease related to climate change exposure

Injury

Mitigation/Adaptation:

mitigation or adaptation strategy is a focus of resource

Mitigation

Model/Methodology:

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Population of Concern: A focus of content



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Population of Concern:

populations at particular risk or vulnerability to climate change impacts

Elderly

Resource Type:

format or standard characteristic of resource

Research Article

Timescale:

time period studied

Long-Term (>50 years)

Vulnerability/Impact Assessment:

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content